

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue of:  
Sanchez et al.

Patent No.: 5,635,235  
Date of Patent: June 3, 1997

Application No.: 09/753,171  
Filing Date: 12/29/00

For: METHODS FOR HANDLING MASA

Examiner: A. Corbin

Group Art Unit: 1761

Irvine, California  
April 11, 2002

**REQUEST FOR CONFIRMATION OF MAINTENANCE FEE PAYMENT**

Assistant Commissioner for Patents  
Washington, DC 20231

Dear Sir:

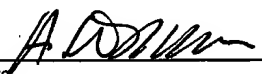
Applicants respectfully request confirmation of its having timely paid the maintenance fees for original Patent No. 5,635,235, which patent was reissued as reissue patent RE37008. Paragraph 9 of the Office Action mailed on 10/03/01 says that "[s]ince the original patent 5,635,235 has expired due to nonpayment of maintenance fees, no reissue can be issued." This is incorrect.

The facts that are relevant to the validity of this continuation reissue application are as follows:

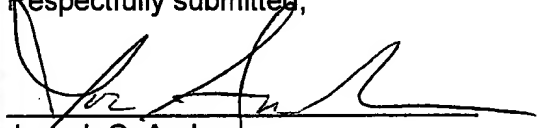
- On June 3, 1997, the original patent 5,635,235 issued such that the first maintenance fee was payable during the window of time between June 3, 2000 and June 3, 2001.
- On January 2, 2001, during the maintenance fee window, the first reissue application no. 09/325,122 issued as reissue patent RE37008 (see Tab A). The original patent 5,635,235 was thereby "surrendered", of course, in compliance with 35 U.S.C. 251.

- On March 9, 2001, unaware that the reissue patent RE37008 had already issued, Applicants mailed the maintenance fee documents and related fees for the original patent 5,635,235 to the United States Patent and Trademark Office (see Tab B).
- On March 12, 2001, the foregoing materials were received by the United States Patent and Trademark Office as evidenced by the date stamp on the return postcard (see Tab C).
- On March 27, 2001, Applicants faxed information regarding reissue patent RE37008 to Ms. Teresa Allen of the United States Patent and Trademark Office (see Tab D).
- On April 3, 2001, our office received a Maintenance Fee Statement indicating that the maintenance fee had been paid in the reissue patent RE37008 (see Tab E).

Based on the foregoing, Applicants respectfully submit that the maintenance fees have been paid for original patent 5,635,235 or, equivalently speaking, for reissue patent RE37008.

<b><u>Certificate of Mailing</u></b>	
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231 on <u>April 11, 2002</u>	
By Angela Williams	
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April 11, 2002	

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**A**



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(19) **United States**  
 (12) **Reissued Patent**  
**Sanchez et al.**

(10) **Patent Number:** **US RE37,008 E**  
 (45) **Date of Reissued Patent:** **Jan. 2, 2001**

(54) **METHODS FOR HANDLING MASA**

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(73) **Assignee:** Casa Herrera, Inc., Pomona, CA (US)

(21) **Appl. No.:** 09/325,122

(22) **Filed:** Jun. 3, 1999

**Related U.S. Patent Documents**

Reissue of:

(64) **Patent No.:** 5,635,235  
**Issued:** Jun. 3, 1997  
**Appl. No.:** 08/476,198  
**Filed:** Jun. 7, 1995

**U.S. Applications:**

(62) Division of application No. 08/192,458, filed on Feb. 7, 1994, now Pat. No. 5,592,870.

(51) **Int. Cl.<sup>7</sup>** ..... A21C 9/00

(52) **U.S. Cl.** ..... 426/496; 426/502; 426/503; 426/512; 426/518; 99/443 C; 99/353; 198/604; 198/607; 198/626.1; 221/84

(58) **Field of Search** ..... 426/391, 496, 426/502, 503, 518, 549, 516, 302, 517; 99/443 C, 353, 352; 198/604, 607, 626.1; 221/84, 71, 74

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(57) **ABSTRACT**

Masa handling methods for the continuous processing of masa type dough in conjunction with commonly available feed processing equipment, such as a masa extruder, an oven, or cooling apparatus. One masa handling method includes a masa separator having a pair of opposed, endless belt conveyors having facing surfaces spaced apart to receive a generally continuous masa stream output from a nozzle on the masa extruder. When the masa stream moves between the conveyors, it is gripped by their facing surfaces and moved away from the nozzle, causing the masa to be separated into individual pieces, or logs. The masa handling method can also include feeding the masa to masa hoppers fed by at least two endless belt conveyors arranged in upstream and downstream positions relative to each other. The masa is transported along the conveyors and is automatically diverted into one masa hopper by a diverter gate operated by a controller that receives a signal from a sensor sensing a masa level within an associated one of the hoppers. The hopper has one or more rotating shafts having projections to remove gas bubbles from the masa and force it toward the sheeter rollers. A pair of primary rollers with scrapers can be provided within the hopper to roll the masa to an intermediate thickness before it passes between the sheeter rollers.

35 Claims, 4 Drawing Sheets

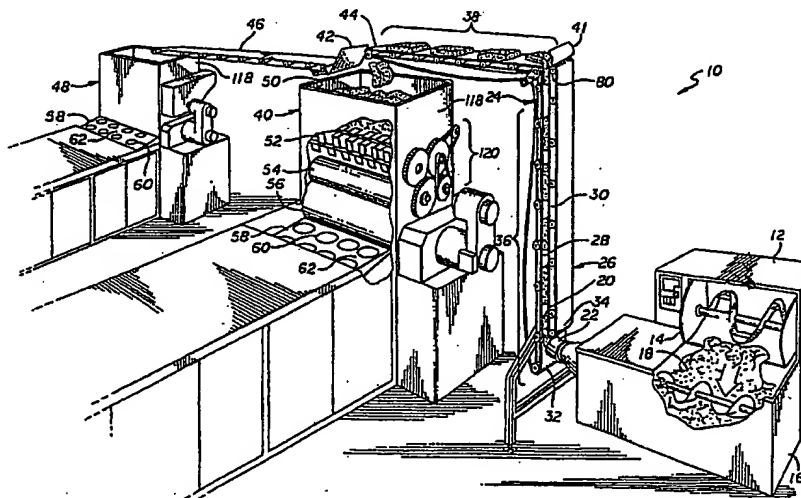
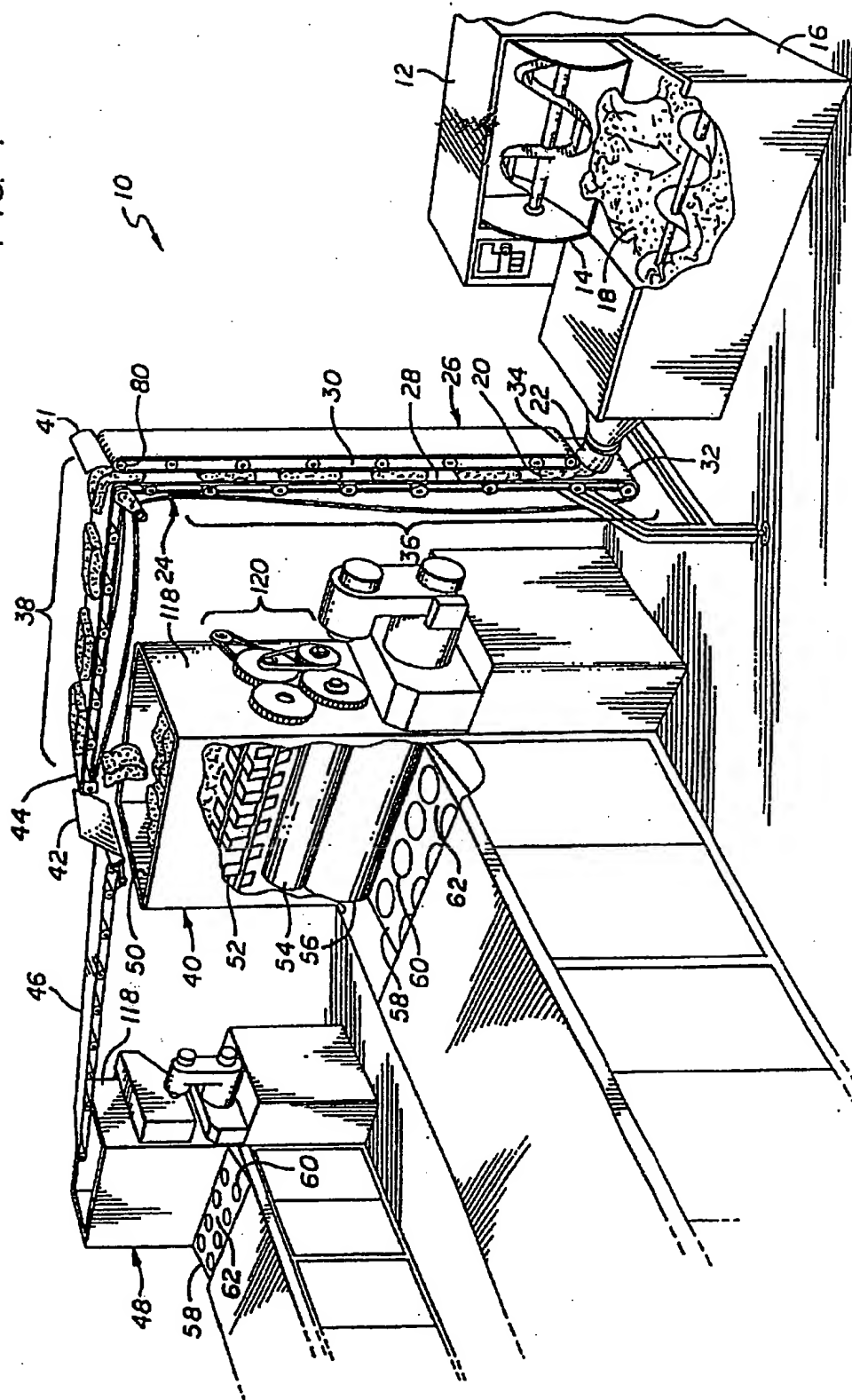
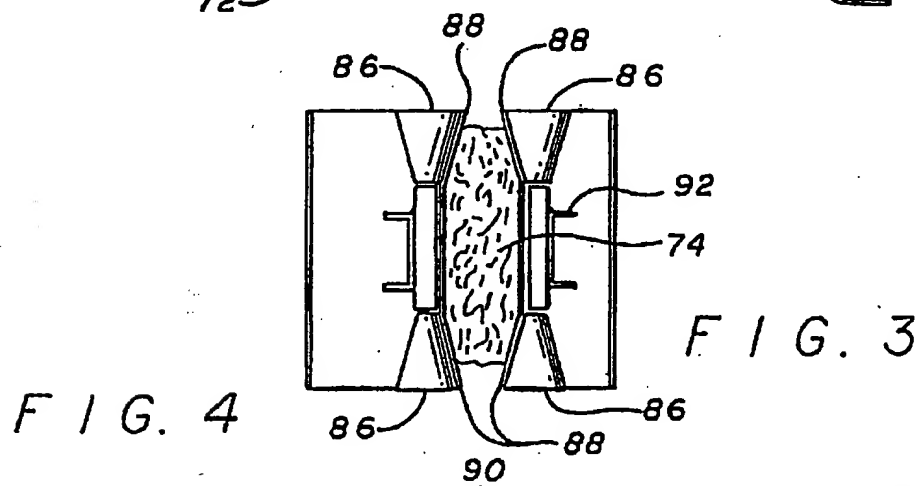
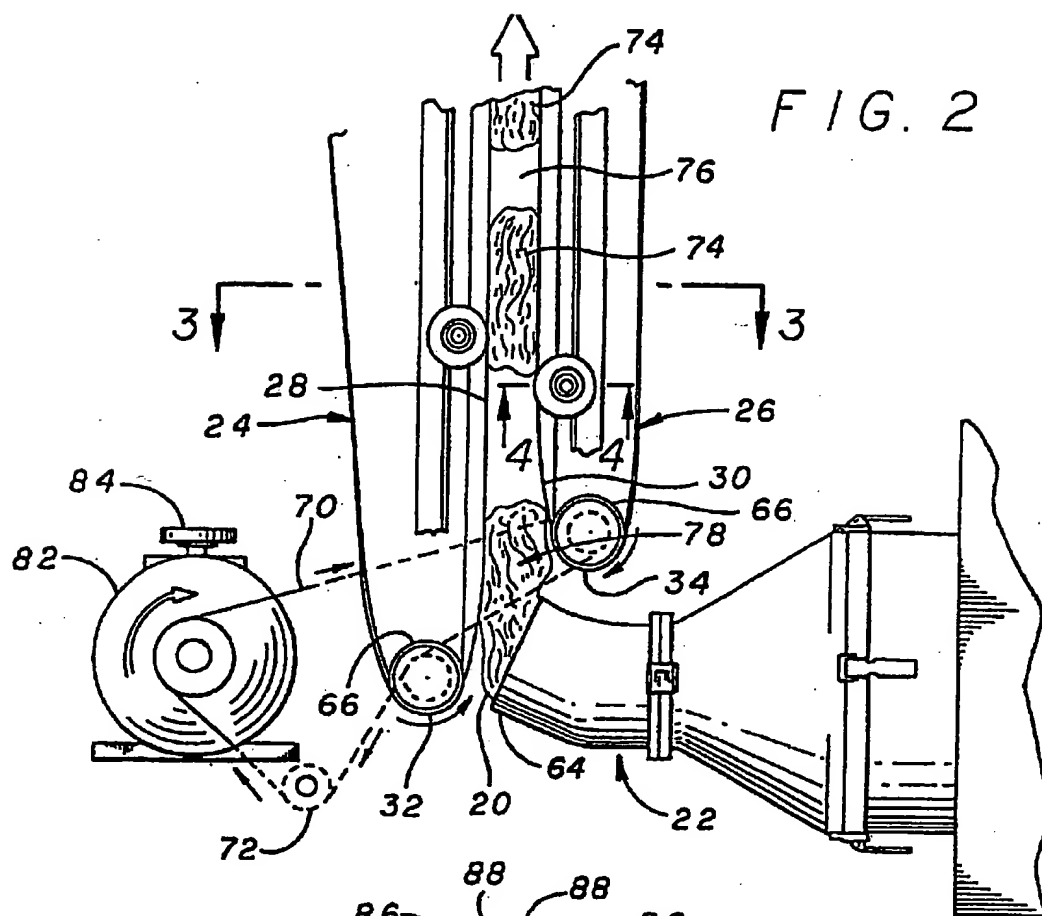
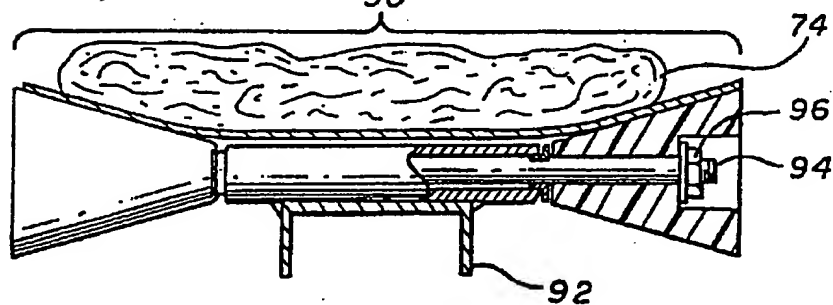


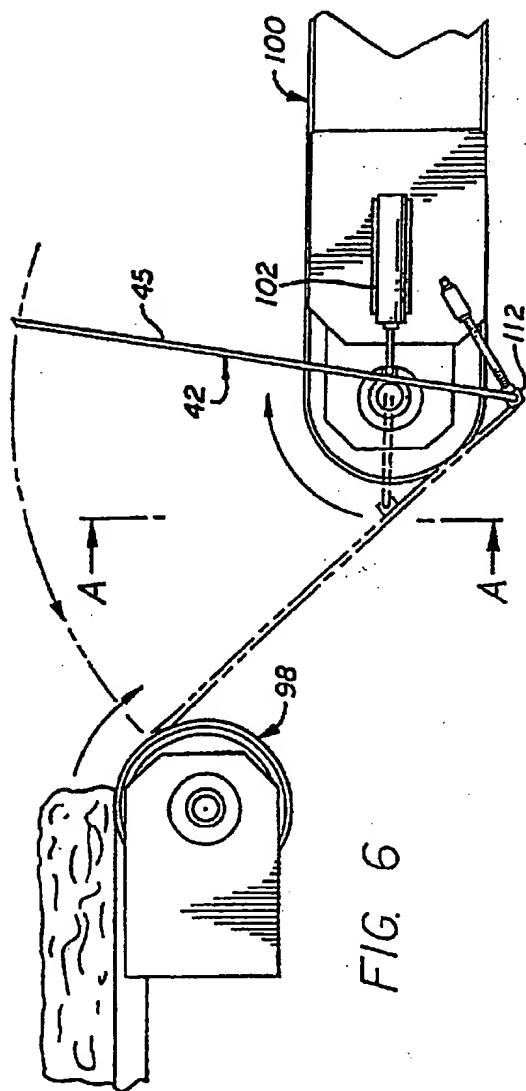
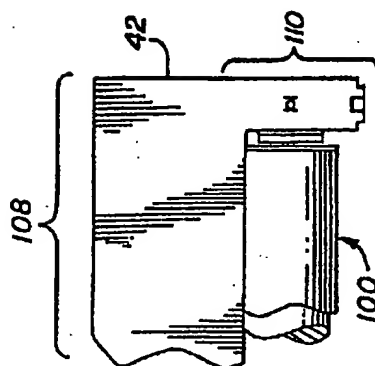
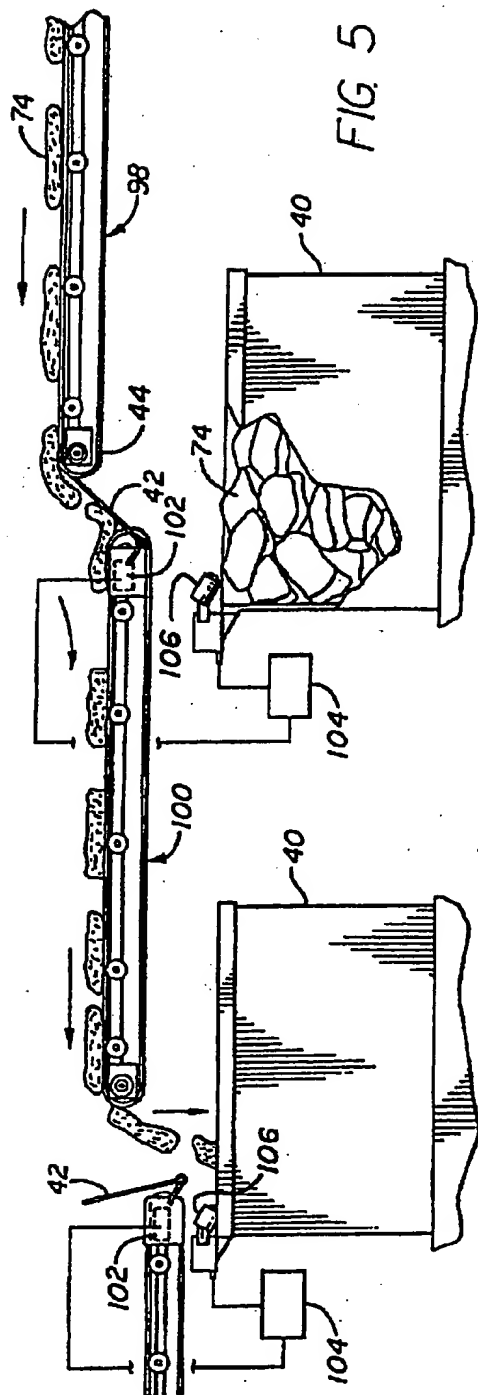
FIG. 1

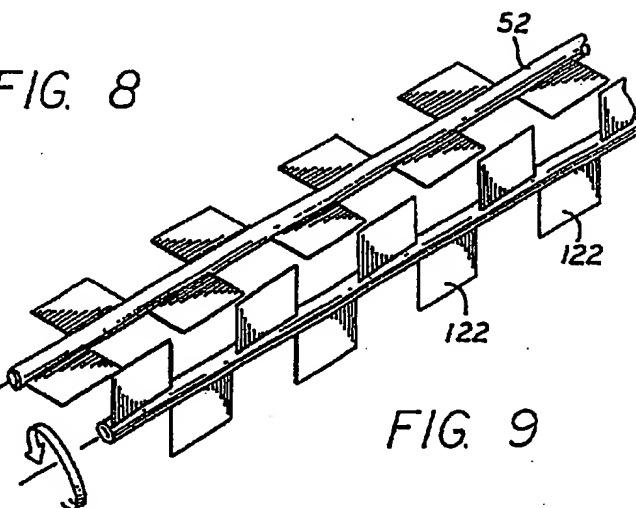
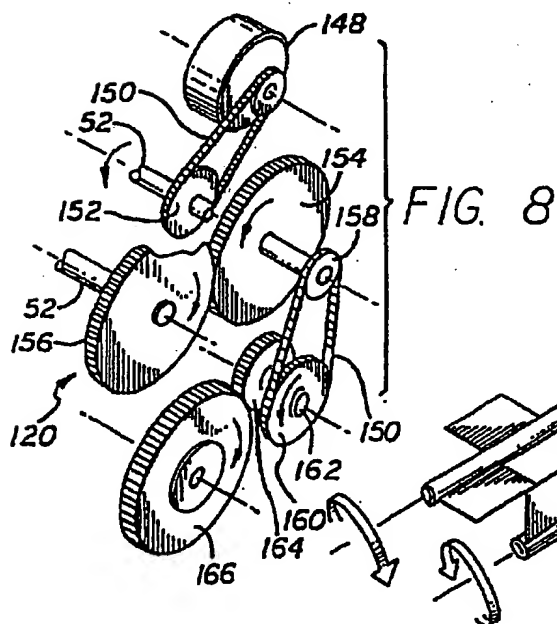
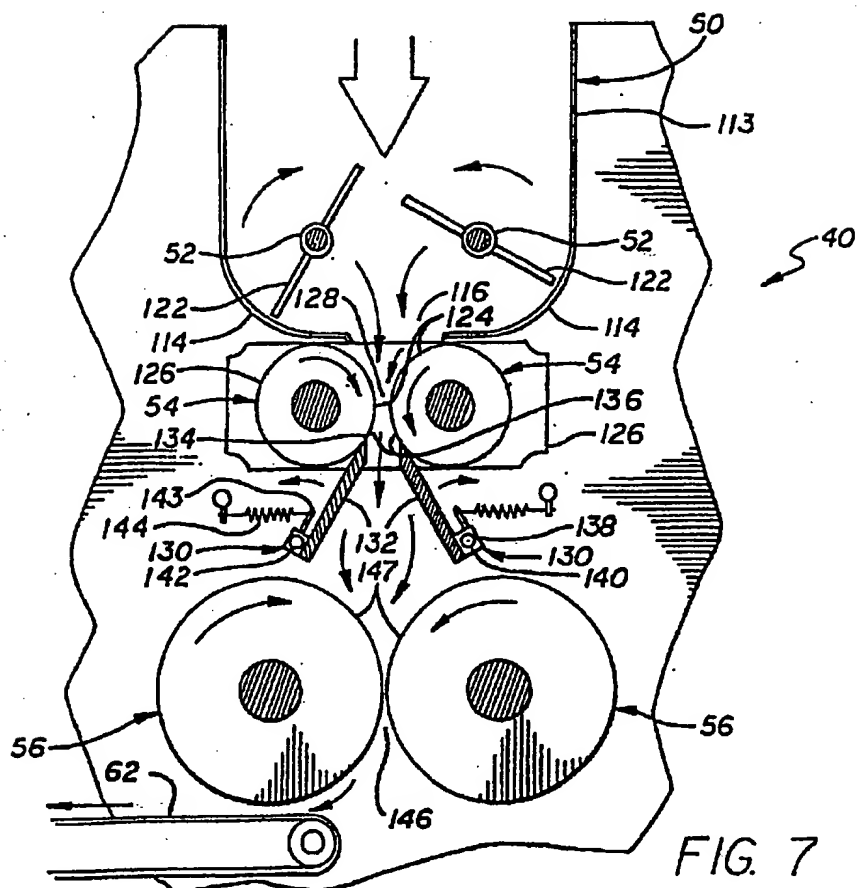




**FIG. 4**









## METHODS FOR HANDLING MASA

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This application is a division of application Ser. No. 08/192,458, filed Feb. 7, 1994, now U.S. Pat. No. 5,592,870.

## FIELD OF THE INVENTION

The present invention relates to an apparatus and method for the commercial manufacture of food or edible material, and, more particularly, to the treatment or preparation of farinaceous dough, banter, or pastry products including sheeting, laminating, or folding.

## BACKGROUND OF THE INVENTION

A tortilla is a baked grain product which originated in Mexico and is now widely consumed throughout the world. The word tortilla as used herein refers to such a baked grain product having a variety of shapes, including a circular shape, formed from a relatively flat dough. While the present invention concerns the production of tortillas, the invention also may also successfully used in the production of food products having other shapes.

As the demand for tortillas has grown, the methods and the apparatus for automatically producing tortillas in high volumes has become well known. In the conventional automated system, a dough is produced by cooking whole corn and grinding it wet or by combining instant corn masa flour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics. The masa is often fed into an extruder which compresses the masa and outputs it in the form of a generally continuous stream to a pneumatic cutter. The pneumatic cutter chops the masa into generally cylindrical pieces, generally known as "logs". The logs are usually carried on a conveyor to a masa hopper, which gravity feeds the masa to several successive pairs of generally opposed, cylindrical rollers for compression into a sheet having the thickness required for tortilla production. The final pair of opposed rollers are generally known as "sheeter" rollers because they produce a thin sheet of masa. This "sheeted" masa is then cut into the desired tortilla shape by a commonly available rotary cutter, which usually cuts circles of varying diameter. The cut masa is then baked, cooled, and packaged by commonly available commercial food processing equipment.

A portion of an automatic masa processing system is shown in the Driscoll U.S. Pat. No. 2,869,971. The masa processing system described by Driscoll has an endless belt conveyor for feeding masa to a masa hopper. The masa within the masa hopper is then gravity fed into a pair of opposed, counter-rotating primary rollers which compress the masa into a wide curtain of an intermediate thickness. The curtain then moves along a conveyor to a set of sheeter rollers for a final compression into the sheet having a thickness suitable to form the desired tortillas. The sheeted masa is then moved, via conveyor, through a rotating cutter which stamps circular shapes in the masa sheen. Although the rest of the Driscoll apparatus is designed to manufacture food chips from the cut masa, the remainder of the process of baking and cooling tortillas, which only generally concerns this invention, is well known and is schematically shown in the Cope et al. U.S. Pat. No. 4,978,548. Also by

way of reference, another Matuszak et al. U.S. Pat. No. 4,640,843, describes a masa extruder and a masa hopper feeding two primary rollers and one associated sheeter roller.

The inventors of the present invention have no reason not to believe that the masa processing system previously described is not generally effective and safe. However, under certain conditions, there may be some drawbacks associated with masa processing systems generally designed according to the prior art. One such drawback can be the danger associated with the pneumatic cutter. The pneumatic cutter has a reciprocating blade which could injure an attending worker if that worker places his or her hands under the operating blade.

Another drawback can be associated with the conveyors intended to transport the masa logs from the pneumatic cutter to the masa hoppers. With increasing demand for tortillas, many companies now desire to operate several parallel production lines, each line having its own masa hopper and its own associated subsequent rolling, cutting, cooking, cooling, and packaging apparatus. Generally, because one masa mixer and extruder can output enough masa to adequately supply several production lines, it is desirable to have an automatic masa hopper feed system capable of maintaining an adequate supply of masa within each masa hopper. However, the conveyors designed according to the prior art simply move masa logs from the pneumatic cutter to one masa hopper. Thus, a masa handling system built according to the prior art could require several conveyors, each running independently from the pneumatic cutter to an associated masa hopper. Furthermore, human attendants could be required to monitor the level of masa in each masa hopper and guide the masa logs onto the conveyors which are running to near-empty masa hoppers. Such a system could have evident disadvantages due to the labor cost of the attendants and the awkwardness of the manual channeling of masa to each conveyor. Furthermore, if the system utilizes only one conveyor running past the masa hoppers in series, the unwanted labor expense is also necessary because human attendants could be required to maintain the masa levels by manually carrying the masa logs from the conveyor to a near-empty masa hopper.

Yet another drawback can be associated with the masa hoppers generally designed according to the prior art. Unwanted gas bubbles can become trapped in the masa and cause voids in the wide masa curtain output by the primary rollers. When this occurs, the voids persist as the masa continues through the sheeter rollers and the rotary cutter, causing imperfectly formed tortillas to be produced. To eliminate the voids, human attendants must manually compress the masa while it is in the masa hopper, resulting in undesirable increased costs.

One final drawback associated with the primary rollers designed according to the prior art can be the tendency of the masa curtain to adhere to the primary rollers after its initial compression. If the masa curtain exits from the primary rollers in a fashion whereby it is stuck to the surface of one of the rollers, the curtain can be carried around the primary roller and away from the sheeter rollers. As a result, the flow of masa to the sheeter rollers can be substantially disrupted.

It should, therefore, be appreciated that there still is a need for masa processing system that has the following features: the safe separation of the masa into individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hopper; and the prevention of the masa curtain from becoming stuck to the primary rollers. Accordingly, the present invention fulfills all of these needs.

## SUMMARY OF THE INVENTION

The present invention provides a masa handling system that has the following features: the safe separation of the masa into the individual logs; the automatic distribution of those logs to the masa hoppers requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers. The masa handling system of the invention is for use in conjunction with commonly available food processing equipment, such as an oven and cooling apparatus for the commercial processing of masa. By way of example, the present inventors refer to masa, but intend to include other similar doughs within the meaning of the word "masa."

Such masa processing equipment generally has a masa producing device, typically a mixer and an adjacent extruder which produces a generally continuous stream of masa to the invention. The masa is processed according to the invention and is ultimately fed into a pair of opposed, aligned, counter-rotating sheeter rollers which compress the masa into a final thickness.

More particularly, the masa handling system has a masa separator having a pair of aligned, opposed endless belt separator conveyors. The separator conveyors have their facing surfaces spaced apart and generally parallel to define a masa chamber therebetween. The masa chamber has input and output ends. The masa separator also has a nozzle connected to the masa producing device for feeding masa into the input end of the masa chamber. When the masa enters the masa chamber, it is gripped by the facing surfaces and moved therebetween. The facing surfaces of the separator conveyors move in the same direction away from the nozzle and cause the masa to be separated into masa logs.

The masa handling system includes at least two masa hoppers and at least two endless belt feed conveyors which have upper surfaces that move in the same direction. The feed conveyors are arranged in relative upstream and downstream positions relative to each other. The upstream feed conveyor extends from the output end of the masa chamber defined by the opposed, aligned separator conveyors of the masa separator, receive the masa logs. The upstream feed conveyor extends to a point generally above one of the masa hoppers. The downstream feed conveyor extends from a position spaced from the upstream conveyor to a point generally above another of the masa hoppers.

The masa handling system also has a diverter gate that is positioned between the feed conveyors. The diverter gate selectively moves between a first position and a second position. When the diverter gate is in the first position, the masa logs are guided from the upstream feed conveyor to the downstream feed conveyor. When the diverter gate is in the second position, the masa logs are guided into the masa hopper.

The masa handling system also has a sensor associated with each masa hopper for the sensing of the level of masa therein. The sensor causes a signal which changes its state when the level of masa in the associated masa hopper is below a predetermined level. A mechanism is connected to each diverter gate and is responsive to the signal from the sensor. The mechanism moves the diverter gate from the first position to the second position when the level of masa in the one masa hopper is sensed to be below the predetermined level. The mechanism returns the diverter gate to the first position when the level of masa in the one masa hopper is sensed to be above a predetermined level.

The masa hoppers are self feeding and each has an opening positioned for receiving masa from its associated

feed conveyor. Each masa hopper also has a gravity feeder with side walls and a bottom wall cooperating to define a space for the placement of the masa to be fed to the sheeter rollers. One or more rotating shafts are mounted within the gravity feeder. Each shaft has projections which remove gas bubbles from the masa and force the masa towards the sheeter rollers. The bottom wall of the gravity feeder extends from the side walls and defines a slot which the masa passes through, towards the sheeter rollers.

The foregoing structural arrangement of the invention provides several important advantages. Chief among them is the safe separation of the generally continuous masa stream into masa logs. As discussed above, the devices designed according to the prior art incorporate a pneumatic cutter that has a blade which can injure attending workers. Accordingly, it is desirable to separate the masa stream into masa logs without the pneumatic cutter and its associated danger. The present invention avoids this problem because it does not utilize a cutter with a blade. Therefore, the present invention offers a relatively safer apparatus which can separate the masa stream into masa logs.

Another advantage associated with the invention is the automatic distribution of the masa logs to the individual masa hoppers requiring resupply. As discussed above, it is desirable to eliminate the cost of the human labor associated with maintaining the proper level of masa within each masa hopper. The automatic monitoring by the sensors and the corresponding automatic operation of the diverter gates provides for the automatic distribution of masa logs to the masa hoppers. Accordingly, the supply of masa within each masa hopper is advantageously maintained without the costs associated with human labor.

Yet another advantage with the invention is the automatic removal of gas bubbles from the masa within the masa hoppers. As discussed above, it is desirable to eliminate the human labor associated with the removal of the gas bubbles from the masa within the masa hoppers. The projections on the rotating shafts advantageously compress the masa and remove the gas bubbles without any corresponding human labor. Accordingly, the gas bubbles are advantageously removed without the costs associated with such human labor.

In one aspect of the invention, the facing surfaces of the separator conveyors are curved toward each other so that a cradle is formed for securely holding the masa between the separator conveyors. As compared to an arrangement having flat facing surfaces, the masa is less likely to move out from its position between the separator conveyors.

In another aspect of the invention, each masa hopper has a scraper for each of its primary rollers. Each scraper has a blade which is pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller. The blade separates the masa which has adhered to the surface of the primary roller. An advantage associated with this aspect of the invention is the prevention of the masa curtain from becoming stuck to the lower surface of the primary rollers. As discussed above, it is desirable to maintain the movement of the masa curtain toward the sheeter rollers. When the masa curtain adheres to one of the primary rollers, the masa curtain may not continue toward the sheeter rollers. Accordingly, this aspect of the invention advantageously ensures that the masa curtain travels toward the sheeter rollers instead of becoming diverted by adherence to one of the primary rollers.

It will be appreciated that, while the masa handling system of the present invention is especially adapted for use

with a corn based masa dough, the invention will also handle any dough that has similar properties. Accordingly, the invention could also be used in conjunction with any other dough which could be handled according to the masa dough handled by the present invention.

Other features and advantages of the present invention will become apparent from the following description of the preferred embodiment, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The following drawings illustrate the preferred embodiment of the invention. In the drawings:

FIG. 1 is a perspective view of a masa handling system, partly in cut away section.

FIG. 2 is a side view showing the separator conveyors accepting masa from the nozzle.

FIG. 3 is a cross-sectional elevational view of the separator conveyors shown in FIG. 2.

FIG. 4 is a cross-sectional elevational view, partially in cut-away section, of the idler rollers shown in FIG. 3.

FIG. 5 is a side view of several feed conveyors positioned over two masa hoppers, shown in partial cut-away section.

FIG. 6 is a side view of a diverter gate shown in FIG. 5.

FIG. 6A is an end view of the diverter gate shown in FIG. 6, shown in partial cut-away section.

FIG. 7 is a side view, in partial cut-away section, of a masa hopper shown in FIG. 1.

FIG. 8 is a perspective view of the A/C motor and drive gears for the primary rollers and rotating shafts shown in FIG. 7.

FIG. 9 is a detail perspective view of the rotating shafts shown in FIG. 7.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the exemplary drawings, the present invention is embodied in a masa handling system, generally referred to by the reference numeral 10, for use within a food processing system which produces a food product made from masa. Masa is a dough produced by cooking whole corn and grinding it wet or by combining instant corn masa flour with water in a commonly available mixer. This dough is generally referred to as "masa". However, the term "masa" as used herein refers to this corn dough and other doughs having similar characteristics.

The preferred masa handling system 10 (FIG. 1) is a part of a larger arrangement of apparatus intended for the commercial production of tortillas or other food having a masa dough as an ingredient. The general arrangement of the preferred masa handling system 10 will now be described. A commonly available commercial mixer 12 is located at the beginning of the production line. The mixer 12 has a pivoting door 14 which can rotate downward towards a masa extruder 16. The masa extruder 16 can be of any type, as long as it compresses the masa 18 and feeds a generally continuous masa stream 20 through a nozzle 22. Two vertically opposed and aligned endless belt separator conveyors 24 and 26 have moving surfaces 28 and 30 which face each other. The longitudinal ends 32 and 34 of separator conveyors 24 and 26 are mounted adjacent to the nozzle 22. One of the two separator conveyors 24 is "L" shaped and has a vertical section, or vertical portion, 36 and a horizontal

section, or horizontal portion, 38 which terminates above [a] an intermediate masa hopper 40 that is in between two feed conveyors as shown in FIG. 1. The vertical section 34 of the "L" shaped separator conveyor 24 extends longitudinally below the longitudinal end of the other separator conveyor, thereby providing a moving surface opposite from the nozzle 22. A deflector plate 41 is mounted on the end of the other separator conveyor 26. The previously discussed separator conveyors 24 and 26 move the masa 18 to the first intermediate masa hopper 40. That masa 18 hopper 40 must be supplied with masa 18 periodically.

A selectively operable diverter gate, for periodically allowing resupply of the masa hopper 40, is located [adjacent to the end 44 of] in a gap between an upstream feed conveyor (the horizontal section 38 of the "L" shaped separator conveyor 24 as shown in FIG. 1) and a downstream feed conveyor 46. The diverter gate 42 is shown in its open gap position. However, when the diverter gate 42 is [closed] in a closed gap position, its top surface 45 forms a gravity slide that feeds to a horizontal downstream feed conveyor 46, which, in turn, feeds another masa hopper which, as shown in FIG. 1, may be an end masa hopper 48. It will be understood that while two masa hoppers 40 and 48 are shown, the masa handling system 10 can be adapted for use with any number of masa hoppers. Therefore, the invention is not limited by the number of masa hoppers.

Each masa hopper 40 and 48 has a hollow inner gravity feeder portion 50 containing two counter rotating shafts 52 mounted above a pair of primary rollers 54. The primary rollers 54 are, in turn, mounted above a pair of sheeter rollers 56 and a common rotary cutter (not shown). A horizontal tortilla conveyor 58 is mounted below the rotary cutter and has tortillas 60 on its upper surface 62. The remainder of the system can include various combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system.

The masa handling system 10 has a structure intended to separate masa logs 74 from a continuous stream of masa 20 (FIGS. 2, 3, and 4). The masa extruder 16 is connected to a nozzle 22. The nozzle 22 has a generally circular cross section and is angled so that its end 64 is slightly elevated. A generally continuous masa stream 20 is shown exiting from the nozzle 22. The ends of two aligned, opposed, vertical endless belt separator conveyors 24 and 26 are spaced apart and each pass around an associated one of two drive rollers 66 adjacent to the nozzle 22. The drive rollers 66 are connected to a variable speed A/C motor 82 via a belt 70, which also passes around a tensioner wheel 72. The "L" shaped separator conveyor 24 extends longitudinally below the end of the other separator conveyor 26 and has a moving surface 28 facing the nozzle 22. The other separator conveyor 26 also has a moving surface 30. The separator conveyors 24 and 26 are spaced to hold masa pieces, or logs 74, between them. The distance separating the two separator conveyors 24 and 26 will vary with the size of the generally continuous masa stream 20 extruded from the nozzle 22. The space between the moving surfaces 28 and 30 of the separator conveyors 24 and 26 defines a masa chamber 76. The masa chamber 76 extends the vertical length of the separator conveyors 24 and 26 and has an input end 78 adjacent to the nozzle 22 and an output end 80 where the masa logs 74 are deposited onto the horizontal section 38 of the "L" shaped conveyor 24. The separate conveyors 24 and 26 must be driven in order to separate the masa logs 74 and move them away from the nozzle 22.

The variable speed A/C motor 82 is provided to drive the separator conveyors 24 and 26. The A/C motor 82 has an

upper knob 84 to enable the user to adjust its speed. The required power of the motor 82 varies with the length of the separator conveyors 24 and 26 to be driven, however, an A/C motor 82 between  $\frac{1}{2}$  and 3 horsepower is generally adequate for most applications. The method by which the speed of the motor 82 is adjusted is commonly known and can be either by a mechanical means, such as a gearbox (not shown), or an electronic means, such as by an A/C frequency inverter (not shown). While the masa 74 moves upward, the masa 74 must be prevented from falling out from between the separator conveyors 24 and 26.

The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are supported by trapezoidal idler rollers 86 which keep the masa logs 74 between the separator conveyors 24 and 26. The trapezoidal idler rollers 86 cause the moving surfaces 28 and 30 of the separator conveyors 24 and 26 to curve toward each other on their edges 88. Because the edges 88 of the moving surfaces 28 and 30 are curved toward each other, a cradle 90 is formed for securely holding the masa logs 74 between the separator conveyors 24 and 26. Each idler roller 86 is fastened to the frame 92 of the conveyors 24 and 26 by well known means, such as by a threaded axle 94 and a nut 96. After the masa logs 74 have been separated from the masa stream 20, they must be guided into a masa hopper 40 which requires resupply.

The selectively operable diverter gate 42 (FIG. 5) is mounted in a gap between an upstream 98 and a downstream 100 endless belt feed conveyor and guides the masa logs 74 to the appropriate masa hopper. The feed conveyors 98 and 100 are positioned end to end thereby forming the gap between them (as shown in FIG. 5), and are vertically spaced so that the masa logs 74 can move from one feed conveyor 98 and 100 to the next, in series. The diverter gate 42 is pivotally mounted on the downstream feed conveyor 100 and, in the closed gap position, extends to the end of the upstream feed conveyor 98 thereby closing the gap by forming a gravity slide between the two feed conveyors 98 and 100. In the open gap position, the diverter gate 42 is withdrawn from the upstream feed conveyor 98. While two diverter gates 42 are shown, any number can be used, depending on the number of masa hoppers 40 desired. Generally, every masa hopper 40, except the last in the series, has an associated diverter gate 42 mounted above it. The last masa hopper 40 does not have a diverter gate 42 because a feed conveyor 46 terminates above it. It will be understood, however, that the last masa hopper 40 could have an associated diverter gate 42 should the diversion of masa 74 from that masa hopper 40, for recycling or other purposes, be desired. The diverter gate 42 must be driven by a device in order to move between the open and closed positions.

The selectively operable diverter gate 42 (FIGS. 6 and 6A) is driven by a pneumatic cylinder 102 which is controlled by a common programmable language controller 104 (PLC). The PLC 104 is shown as separate boxes in FIG. 5 for clarity purposes. Preferably, only one PLC 104 is needed to drive multiple diverter gates 42, however, each diverter gate 42 could have its own associated PLC 104. The PLC 104 is also connected to a photo sensor 106 positioned to sense the level of masa 74 within the masa hopper 40 and provide the corresponding signal to the PLC 104. The diverter gate 42 is connected to a pneumatic cylinder 102 mounted on the downstream feed conveyor 100. The diverter gate 42 has a generally rectangular section 108 extending across the width of the feed conveyors 98 and 100 and a smaller rectangular arm 110 protruding below the rectangular section 108. The smaller rectangular arm 110

facilitates the attachment of the diverter gate 42 to the pivot point 112 and the pneumatic cylinder 102 mounted on the side of the downstream feed conveyor 100. When the pneumatic cylinder 102 withdraws the diverter gate 42 away from the upstream feed conveyor 98, the masa logs 74 drop off of the upstream feed conveyor 98, accordingly, a structure must be provided to catch the masa logs 74.

A self feeding masa hopper 40 (FIG. 7, 8, and 9) is located beneath the end of the upstream feed conveyor 98 and catches the masa logs 74 after they have been diverted. The self feeding masa hopper 40 has a gravity feeder including side walls 113 and a curving bottom wall 114 which defines a slot 116. A pair of horizontal counter-rotating shafts 52 are mounted within the gravity feeder 50. The shafts 52 are generally parallel to each other and longitudinally straddle the slot 116, which is below the shafts 52 in the bottom wall of the gravity feeder 50. One end of each of the shafts 52 extends through the wall 118 of the masa hopper 40 to interface with drive gears 120 to be described later. The shafts 52 have rectangular projections 122 which are positioned in an alternating fashion so as to enable the projections 122 to intermesh and pass through the same space above the slot 116 as they are rotated. When the projections 122 pass above the slot 116, they drive the masa 74 through the slot 116 so it can be rolled. Accordingly, a structure must be provided to roll the masa 74.

The self feeding masa hopper 40 has a pair of horizontal primary rollers 54 to accept the masa 74 which passes through the slot 116. The primary rollers 54 have a cylindrical surface 124 and are mounted in a generally parallel, horizontally aligned relationship between two endcaps 126. The endcaps 126 prevent the masa 74 from moving horizontally, along the surface 124 of the primary rollers 54, past the ends of the primary rollers 54. The primary rollers 54 are positioned so that a gap 128 is defined between their converging surfaces 124. The gap 128 is below and aligns with the slot 116 to facilitate the travel of the masa 74 from the slot 116 through the primary rollers 54. The width of the gap 128 varies according to the food product to be produced, but is generally  $\frac{1}{4}$  inch for typical tortilla production. It is to be understood that the width of the gap 128 between the primary rollers 54 of the masa hopper 40 can be varied according to the food product. Accordingly, the invention is not to be limited by the gap 128 between the primary rollers 54 of the masa hopper 40. After the masa 74 has passed through the gap 128, the masa 74 often adheres to the surfaces 124 of the primary rollers 54.

Two scrapers 130 are provided to prevent the masa 74 from adhering to the primary rollers 54. Each scraper 130 has a generally rectangular blade 132 which has a sharp point 134 that rides along the lower surface 136 of a primary roller 54 and separates any adhering masa 74. The blade 132 is made from ultra high molecular weight (UHM) copolymer plastic or any common equivalent, such as polytetrafluoroethylene. A stainless steel pivoting beam 138 is attached along the base of the blade 132 by screws (not shown) countersunk into the blade 132 material. The pivoting beam 138 has a generally square cross section, but has cylindrical ends 140. A threaded, centered hole 142 is provided on each end of the beam 138 for attachment to the masa hopper 40. Two arms 143 are perpendicularly attached to each beam 138 and extend behind the blade 132. The arms 143 are joined to the beam 138 by welding or any other common joining process. A spring 144 is connected between the end of each arm 143 and the wall 118 of the masa hopper 40, thereby providing a biasing force to keep the blade 132 riding on the lower surface 136 of the primary roller 54.

Once the masa 74 has passed by the scrapers 130, it has a thickness to great for forming tortillas 60. Accordingly, the masa 74 must be compressed yet again.

Two sheeter rollers 56 are provided for compressing the masa 74 to the final thickness which is suitable for the final cutting of the tortillas 60. The sheeter rollers 56 are generally cylindrical are mounted in a generally parallel, horizontally aligned relationship. The sheeter rollers 56 are positioned so that a gap 146 is defined between their converging surfaces 147. The gap 146 between the sheeter rollers 56 is below and aligns with the gap 128 between the primary rollers 54 to facilitate the travel of the masa 74 from the primary rollers 54 to the sheeter rollers 56. A rotary cutter (not shown) is mounted below the sheeter rollers 56 so that tortillas 60 are expelled onto the horizontal tortilla conveyor 58. The rotary cutter (not shown) is commonly available and can be adapted to cut any shape from the sheeted masa (not shown). The previously described structure, including the rotary shafts 52 and the primary rollers 54, must be driven in order to properly process the masa.

A masa hopper motor 148 (FIG. 8) drives the rotary shafts 52 and the primary rollers 54 through the drive gears 120 on the outside of the masa hopper. The masa hopper motor 148 operates on A/C current and is capable of variable speeds due to an electronic control, such as an A/C frequency inverter (not shown). A mechanical gear arrangement (not shown) may also be used to yield variable speeds. The power of the masa hopper motor 148 varies according to specific applications, but generally a 2 to 5 horse-power motor is adequate. A belt 150 connects the masa hopper motor 148 and a first gear 152 mounted on the first shaft 52. That same shaft 52 extends into the masa hopper and has the projections which compress the masa. A larger second gear 154 mounted on the same rotary shaft 52 intermeshes with a generally equally sized third gear 156 which is mounted to the other shaft 52. Another fourth gear 158 is connected to the first shaft has a belt connected to a lower, fifth gear 160. The fifth gear 160 is mounted on a primary roller axle 162, which has, in turn another, sixth gear 164, which intermeshes with yet another seventh gear 166 mounted on the other primary roller axle 168. While the sites of the sixth 164 and seventh gears 166 can be varied, a ratio of 10.333 to 4.25 is generally preferred. After having understood the interrelating structure of the masa handling system 10, the movement of the masa 74 through the system should now be described.

Generally, the preferred masa handling system 10 is intended to move masa 18 from a commonly available masa extruder 16 to the horizontal tortilla conveyor 58 leading to further food processing equipment, such as a commercial oven or fryer. Generally, masa dough 18 is used for the production of tortillas 60 having varying shapes. However, such dough can be used to produce a variety of other food products.

The process begins (FIG. 1) with the initial creation of the masa 18 in the mixer. When the masa 18 is suitably mixed, the pivoting door 14 opens and allows the attending workers to transfer the masa 18 into the extruder 16. The extruder 16 drives the masa 18 through the nozzle 22 so that a generally continuous masa stream 20 is projected up against the vertical surface 28 of the "L" shaped separator conveyor 24, which is moving upwards. The friction between the masa stream 20 and the vertical surface 28 of the "L" shaped separator conveyor 24 guides the masa stream 20 between the separator conveyors 24 and 26. The masa stream 20 is pulled until it fractures into masa pieces, or masa logs 74. As used herein, the term "masa logs" 74 generally refers to

pieces of masa separated from the generally continuous masa stream 20, including those with a generally oval cross section. The masa logs 74 travel upward and are guided onto the horizontal portion 38 of the "L" shaped separator conveyor 24 by the [detector] deflector plate 41. The masa logs 74 then travel to the selectively operable diverter gate 42, which can either be automatically opened to allow the masa logs 74 to drop into the masa hopper 40, or automatically closed to guide the masa logs 74 to the next feed conveyor 100, which feeds the other masa hoppers 40. The precise operation of the selectively operable diverter gate 42 will be described below. Once in the masa hopper 40, the masa 74 is compressed by the projections on the rotating shafts 52, thereby removing the gas bubbles (not shown) within the masa 74 and forcing the masa 74 into the primary rollers 54. The primary rollers 54 compress the masa 74 into a generally uniform curtain (not shown) which is fed into the sheeter rollers 56. The sheeter rollers 56 compress the masa curtain to a thickness suitable for the cutting of tortillas 60, which is accomplished by the rotary cutter (not shown). The tortillas 60 then are carried by the tortilla conveyor 58 toward the remainder of the processing system (not shown), which can contain combinations of commonly known and widely available commercial food processing apparatus (not shown), such as an oven, a cooling rack, and a packaging system. The following description will provide more detail on the operation of the elements of the masa handling system 10.

The separation of the generally continuous masa stream 20 into masa logs 74 will now be described (FIGS. 2, 3, and 4). The generally continuous masa stream 20 is forced through the nozzle 22 by the extruder. The masa stream 20 has the cross section of the nozzle 22, which is generally circular. However, it will be understood that nozzles having other cross-sectional shapes could also be used. The generally continuous masa stream 20 moves into contact with the vertical surface 28 of the "L" shaped separator conveyor 24, which is moving upwards. The friction between the vertically moving surface 28 of the "L" shaped separator conveyor 24 and the masa stream 20 causes the masa stream 20 to move upwards into contact with the moving surface 30 of the other separator conveyor 26. The masa stream 20 must next be separated into the individual masa logs 74 required for further processing.

Together, the moving surfaces 28 and 30 of the separator conveyors 24 and 26 act to separate the masa stream 20 into individual masa logs 74. The moving surfaces 28 and 30 of the separator conveyors 24 and 26 are moved by the drive rollers 66 which are, in turn, driven by the variable speed A/C motor 82. The tensioner wheel 72 is biased to provide the proper tension on the belt 70 linking the A/C motor 82 to the drive rollers 66. The speed of the A/C motor 82 is adjusted such that moving surfaces 28 and 30 of the separator conveyors 24 and 26 have an upward speed greater than that at which the masa stream 20 travels from the nozzle 22. The moving surfaces 28 and 30 grip the masa stream 20, so the masa stream 20 is carried upward at the same speed. Accordingly, the masa stream 20 is pulled from the nozzle 22 by the moving surfaces 28 and 30 of the separator conveyors 24 and 26 and is fractured into separate masa pieces, or masa logs 74. In this particular embodiment, the masa logs 74 are compressed between the separator conveyors 24 and 26 such that they have an elongated oval cross section. The general length of the masa logs 74 can be adjusted by changing the speed of the A/C motor 82. As the difference between the speed of the separator conveyors 24 and 26 and the speed at which the masa stream 20 is expelled

from the nozzle 22 is increased, the length of the masa logs 74 becomes smaller.

An important advantage is provided by the previously described arrangement and operation of the nozzle 22 and the separator conveyors 24 and 26. Unlike the prior art pneumatic cutter, the masa handling system 10 has no sharp blade which could injure an attending worker. Accordingly, the masa handling system 10 advantageously avoids the dangers associated with a sharp blade, and provides a relatively safer apparatus and method for the separation of a generally continuous masa stream 20 into masa logs 74.

Another advantage associated is associated with the trapezoidal idler rollers 86 which are mounted behind the moving surfaces 28 and 30 of the separator conveyors 24 and 26. The converging edges 88 of the moving surfaces 28 and 30 form a cradle 90 which keeps the masa logs 74 between the separator conveyors 24 and 26. As compared to an arrangement having flat moving surfaces, the masa logs 74 are less likely to fall out from between the separator conveyors 24 and 26. After the masa stream 20 is separated into masa logs 74, the masa logs 74 must be diverted to the horizontal 38, or feed, portion of the "L" shaped separator conveyor 24.

The [detector] deflector plate 41 guides the masa logs 74 onto the horizontal portion 38 of the "L" shaped separator conveyor 24. The masa logs 74 then move towards the selectively operable diverter gates 42. The photo-sensor 106 mounted adjacent to each masa hopper 40 senses the level of masa 74 therein. If the level of the masa 74 within any one masa hopper 40 drops below a predetermined level, the sensor 106 associated with that masa hopper 40 changes the state of its signal which is sent to the PLC 104. The PLC 104 then commands the pneumatic cylinder 102 to retract the diverter gate 42 located above that masa hopper 40. That diverter gate 42 pivots into an open gap position and the masa logs 74 then fall into [that] the intermediate masa hopper 40. The photo-sensor 106 then signals the PLC 104 when the level of masa 74 within that masa hopper 40 rises above a certain predetermined level. The PLC 104 then commands the pneumatic cylinder 102 to extend, thereby closing that diverter gate 42 and allowing the masa logs 74 to travel on to the next masa hopper [40] 48.

An advantage associated with the diverter gates 42 is the corresponding labor savings due to their automatic operation. Normally, human attendants would be necessary to ensure that the masa hoppers 40 each had a proper supply of masa 74. By utilizing the photo-sensors 106, the PLC 104, and the pneumatic cylinders 102, the diverter gates 42 operate automatically and the supply of masa logs 74 within each masa hopper 40 is maintained without costly human labor. It should be understood that, while a PLC 104 is preferably used to control the diverter gates 42, a corresponding logic system having electronic relays could also be used to perform the same control functions as the PLC 104. Once the masa logs 74 have been fed to the appropriate masa hopper 40, they must be compressed to remove gas bubbles which cause voids in the rolled masa (not shown).

The self feeding masa hopper 40 compresses and removes the unwanted gas bubbles from the masa 74. The masa is fed, via gravity, to the rotating shafts 52. The projections 122 on the rotating shafts 52 compress the masa 74 and force it through the slot 116 towards the primary rollers 54. The projections 122 on the rotating shafts 52 advantageously remove gas bubbles by compressing the masa 74 without requiring any human labor. Accordingly, the costs associated with the human attendants required by the prior art masa

hoppers are avoided. Once the gas bubbles are removed from the masa 74, the masa must be rolled into a generally uniform curtain (not shown).

The primary rollers 54 compress the masa 74 into the generally uniform curtain suitable for feeding to the sheeter rollers 56. Both primary rollers 54 are driven by the masa hopper A/C motor 148 and have different sized drive gears 120 so the primary rollers 54 rotate at different speeds. This arrangement is especially advantageous because, as compared to rollers driven at the same speed, the masa 74 is less likely to stick to the lower surface of the primary rollers 54 when they rotate at different speeds. If the masa 74 sticks to the lower surface 136 of one of the primary rollers 54, it is carried around and will not be fed into the sheeter rollers 56. Accordingly, it is desirable to prevent the masa 74 from becoming stuck to the lower surface of the primary rollers 54. However, if, despite the differential speed, the masa 74 becomes stuck to one of the lower surfaces 136 of the primary rollers 54, it must be removed.

The scrapers 130 will advantageously separate the masa curtain if it becomes stuck to the lower surface 136 of one of the primary rollers 54. The springs 144 bias the blades 132 so that they ride on the lower surfaces 136 of the primary rollers 54. Accordingly, when the masa curtain becomes stuck to the lower surface 136 of one of the primary rollers 54, the blade 232 scrapes it off and it continues to travel towards the sheeter rollers 56.

The sheeter rollers 56 counter rotate at the same speed and compress the masa into its final thickness. The rotary cutter (not shown) cuts circular tortillas 60 from the masa on the underside of one of the sheeter rollers 56. The tortillas 60 then fall onto the tortilla conveyor 58 and are moved towards other food processing equipment, such as an oven.

It should be appreciated from the foregoing description that the present invention provides a masa handling system 10 having the following features: the safe separation of the masa stream 20 into individual logs 74; the automatic distribution of those logs 74 to the masa hoppers 40 requiring resupply; the automatic removal of gas bubbles from the masa within the masa hoppers; and the prevention of the masa curtain from becoming stuck to the primary rollers 54.

While a particular form of the invention has been illustrated and described, it will be apparent that various modifications can be made without departing from the spirit and scope of the invention. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

We claim:

1. A method for handling masa within a food processing system having a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers including an end mass hopper and an intermediate masa hopper, the masa hoppers and the separator conveyors connected by at least two endless belt feed conveyors having upper surfaces [moving] that are movable in the same direction, the feed conveyors positioned in an upstream and downstream relationship relative to each other when the feed conveyors are moving in the same direction, at least one [feed conveyor positioned adjacent to the other longitudinal ends of the separator conveyors, each] of the masa [hopper] hoppers having an associated sensor for sensing, the a level of [mass and] masa therein, the intermediate masa hopper having an opening positioned below a [diverter gate located between the feed conveyors, each diverter gate connected to]



gap located between the upstream and downstream feed conveyors, the gap being controlled by an associated mechanism [and pivotable between an open] that provides a closed gap position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and [a closed] an open gap position, where the masa is guided from the upstream conveyor into the intermediate masa hopper positioned below the gap, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

moving the facing surfaces of the separator conveyors [at equal speed] away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa stream contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors;

[gripping] separating the masa stream [between both facing surfaces of the separator conveyors pulling the masa stream such that the masa stream is separated] into masa logs;

feeding the [mass] masa logs onto [the upstream end of] a feed conveyor; [moving the masa logs from the separator conveyors along the upper surfaces of the feed conveyors];

moving the masa logs along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level;

selectively opening and closing the [diverter gate] gap with the associated driving mechanism to control the flow of masa logs to the associated masa hopper in response to said change in signal;

placing the masa logs through the opening of one of the masa hoppers;

feeding the masa logs to at least one shaft within the masa hopper; rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

2. The method as defined by claim 1, wherein the method further comprises the [steps of:] step of:

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

3. The method as defined by claim 1, wherein the method further comprises the step of:

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

4. The method as defined in claim 1, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising:

programming the controller to compare said signal to a predetermined value;

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.]

5. The method as defined in claim 1, wherein said step of feeding the masa logs to at least one shaft within the masa hopper is accomplished by gravity.

6. The method as defined in claim 1, wherein said step of rotating the shaft is accomplished by an A/C motor.

7. The method as defined in claim 1, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

8. The method as defined in claim 7, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the generally horizontal movement of the masa past the ends of the primary rollers.

9. The method as defined in claim 7, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the step of:

separating masa from the lower surface of each of the primary rollers.

10. A method for separating a stream of masa utilizing a pair of aligned, opposed separator conveyors having facing surfaces, the longitudinal ends of the separator conveyors positioned adjacent to a nozzle connected to a masa producing device, the method of separating the masa stream comprising the steps of:

moving the facing surfaces of the separator conveyors at equal speed away from the nozzle;

feeding a generally continuous masa stream through the nozzle such that the masa contacts at least one of the facing surfaces of the separator conveyors and is guided between the facing surfaces of the separator conveyors; and

gripping the masa stream between both facing surfaces of the separator conveyors, pulling the masa stream such that the masa stream is separated into masa logs.

11. The method as defined by claim 10, wherein the method further comprises the step of:

arranging the facing surfaces of the separator conveyors to curve toward each other such that a cradle is formed to securely grip the masa.

12. The method as defined by claim 11, wherein the method further comprises the step of:

adjusting the speed of the facing surfaces of the separator conveyors to change the length of the masa logs.

13. A method of feeding masa to a masa hopper within a food processing system, the food processing system further having a masa producing device and at least [two masa hoppers] an intermediate masa hopper and end masa hopper, the masa hoppers and the masa producing device connected by [at least two] first and second endless belt feed conveyors having upper surfaces [moving] that are movable in the same direction, the first and second feed conveyors positioned in an upstream and downstream relationship relative to each other [each masa hopper] when the feed conveyors are moving in the same direction, at least one of the masa hoppers having an associated sensor for sensing

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[the level of mass and] *a level of masa, the intermediate masa hopper having an opening positioned below a [diverter gate positioned] gap located between the [feed conveyors, each diverter gate connected to] upstream and downstream conveyors, the gap being controlled by an associated [mechanism and pivotable between an open] driving mechanism that provides a closed gap position, where the masa is guided from the upstream feed conveyor to the downstream conveyor, and [a closed] an open gap position, where the masa is guided [into the masa hopper,] from the upstream feed conveyor into the intermediate masa hopper positioned below the gap, the method comprising the steps of:*

moving masa logs, previously separated from a stream of masa produced from the masa producing device, along the upper surfaces of the feed conveyors;

sensing the level of masa within an associated masa hopper;

causing a signal to change its state when the level of masa within the masa hopper is below a predetermined level; and

selectively opening and closing the [diverter gate] gap with the associated driving mechanism to control the flow of masa logs to the masa hopper in response to said change in signal.

[14. The method of feeding masa as defined in claim 13, wherein the mechanism is a pneumatic cylinder connected to a controller, the method further comprising the steps of:

programming the controller to compare said signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the diverter gate.]

15. A method for feeding masa to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having an opening for receiving masa and side walls and a bottom wall defining a slot, the masa hopper also having at least one shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

placing the masa through the opening in the masa hopper; feeding the masa to at least one shaft; rotating the shaft;

removing gas bubbles from the masa with the projections on at least one shaft; and

forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

16. The method for feeding masa as defined in claim 15, wherein said feeding is accomplished by gravity.

17. The method for feeding masa as defined in claim 15, wherein said rotating is accomplished by a motor.

18. The method for feeding masa as defined in claim 17, wherein there is a scrapper for each primary roller, each scrapper having a blade pivotally mounted and biased to longitudinally ride on the lower surface of its associated primary roller, the method further comprising the steps of: separating masa from the lower surface of each of the primary rollers.

19. The method for feeding masa as defined in claim 15, wherein the masa hopper also has a pair of opposed, horizontally, aligned primary rollers between the slot and the sheeter rollers, the primary rollers each having a generally cylindrical surface and two ends, the method further comprising the steps of:

rotating the primary rollers;

drawing the masa between the primary rollers;

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compressing the masa into a generally uniform curtain; and

feeding said uniform curtain into the sheeter rollers.

20. The method for feeding masa as defined in claim 19, wherein the masa hopper also has two endcaps, each endcap mounted around the ends of the primary rollers, the method further comprising the step of:

preventing the movement of the masa past the ends of the primary rollers.

21. The method as defined in claim 1 wherein the upstream and downstream conveyors are operating in a fixed location and wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the upstream and downstream feed conveyors.

22. The method as defined in claim 21 wherein the driven structure is a diverter gate positioned in the gap between the upstream and downstream feed conveyors, and wherein the step of moving the driven structure comprises moving the diverter gate between an open gap position and a closed gap position.

23. The method as defined in claim 21 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control the selective opening and closing of the gap.

24. The method of feeding masa as defined in claim 13 wherein the step of selectively opening and closing the gap with the associated driving mechanism comprises the step of moving a driven structure that is separate from the feed conveyors.

25. The method of feeding masa as defined in claim 24 wherein the moveable structure is a diverter gate positioned between adjacent ends of the upstream feed conveyor and the downstream feed conveyor, and wherein the step of moving the driven structure comprises the step of moving the diverter gate between an open gap position and a closed gap position.

26. The method of feeding masa as defined in claim 24 wherein the associated driving mechanism is a pneumatic cylinder connected to the driven structure, the method further comprising the steps of:

connecting a controller to the pneumatic cylinder;

programming the controller to compare the signal to a predetermined value; and

selectively commanding the operation of the pneumatic cylinder to control said selective opening and closing of the gap.

27. A method for handling masa within a food processing system having a source of masa logs positioned adjacent to a nozzle connected to a masa producing device, the food processing system further having at least two masa hoppers including an end masa hopper and an intermediate masa hopper, the masa hoppers and the source of masa logs connected by a first and second endless belt feed conveyor having upper surfaces, the feed conveyors positioned in an upstream and downstream relationship relative to each other, each masa hopper located adjacent to a pair of aligned, opposed sheeter rollers, the sheeter rollers located adjacent to a masa hopper having side walls and a bottom wall defining a slot, the masa hopper also having at least one



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shaft above the bottom wall, each shaft having projections, the method comprising the steps of:

feeding the masa logs from the source of masa logs onto the first feed conveyor;  
moving the masa logs along the upper surface of the first feed conveyor;  
selectively controlling the flow of masa logs to an associated masa hopper;  
placing the masa logs through the opening of the associated masa hopper;  
feeding the masa logs to at least one shaft within the associated masa hopper;  
rotating the shaft;  
removing gas bubbles from the masa with the projections on at least one shaft; and  
forcing the masa through the slot, toward the sheeter rollers, with the projections on at least one shaft.

28. The method as defined in claim 27 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises opening and closing a gap between the first feed conveyor and the second feed conveyor; the gap positioned above the intermediate masa hopper.

29. The method as defined in claim 28 wherein the step of opening and closing the gap between the first and second feed conveyor comprises moving a driven structure that is separate from the first and second feed conveyor.

30. The method as defined in claim 29 wherein the driven structure is a diverter gate positioned between adjacent ends of the first and second feed conveyor; and wherein the step of moving a driven structure comprises opening and closing the diverter gate.

31. The method as defined in claim 27 further comprising the step of sensing a level of masa within the associated masa hopper.

32. The method as defined in claim 31 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

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33. The method as defined in claim 32 wherein the step of selectively controlling the flow of masa logs to the associated masa hopper comprises the step of selectively opening and closing a gap positioned between the first and second feed conveyor and above the intermediate masa hopper, said opening and closing of the gap resulting from said change in signal.

34. A method of feeding masa to a masa hopper within a food processing system, the food processing system further having a masa producing device, an intermediate masa hopper, and an end masa hopper, the masa hoppers and the masa producing device connected by an upstream and a downstream endless belt feed conveyor, each conveyor having an upper surface, the intermediate masa hopper positioned below a gap defined between the upstream and downstream feed conveyor, the gap being adjustable between a closed gap position where the masa is guided from the upstream conveyor to the downstream feed conveyor, and an open position where the masa is guided into the intermediate masa hopper below the gap, the method comprising the steps of:

moving masa logs along the upper surface of the first feed conveyor; and

selectively opening and closing the gap to control the flow of masa logs to the intermediate hopper positioned below the gap.

35. The method as defined in claim 34 further comprising the step of sensing a level of masa within an associated masa hopper.

36. The method as defined in claim 35 further comprising the step of causing a signal to change its state when the level of masa within the associated masa hopper is below a predetermined level.

37. The method as defined in claim 36 wherein the step of selectively opening and closing the gap comprises selectively opening and closing the gap in response to said change in signal.

\* \* \* \* \*

B

Received in the U.S. Patent and  
Trademark Office; kindly date-stamp and  
return this card

Date: March 9, 2001  
Application No.: 476,198  
Filing Date: June 7, 1995  
Patent No. 5,635,235  
Issue Date: June 3, 1997  
Client: Casa Herrera, Inc.  
For: METHODS FOR HANDLING MASA  
Atty. Dkt. No.: CAS1.PAU.24

---

Enclosed:

1. Maintenance Fee Transmittal  
Form (plus 1 copy);
2. Power of Attorney with  
attachment: Statement Under 37  
CRF 3.73(b);
3. Change of Correspondence  
Address with attachment:  
Statement Under 37 CRF 3.73(b);
4. "Fee Address" Indication Form;
5. Check No. 3288 in the amount of  
\$490.00; and
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PTO/SB/45 (08-00)

Approved for use through 12/31/2002. OMB 0651-0016  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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### MAINTENANCE FEE TRANSMITTAL FORM

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Washington, D.C. 20231

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Assistant Commissioner for Patents, Box M Fee, Washington D.C. 20231" on MARCH 9, 2001

Signature

Typed or printed name Angela Williams

Enclosed herewith is the payment of the maintenance fee(s) for the listed patent(s).

1. ☒ Applicant claims small entity status. See 37 CFR 1.27
2. ☒ A check for the amount of \$ 490.00 for the full payment of the maintenance fee(s) and any necessary surcharge on the following patents is enclosed.
3. ☐ The Commissioner is hereby authorized to charge \$ \_\_\_\_\_ to cover the payment of the fee(s) indicated below to Deposit Account No. \_\_\_\_\_
4. ☒ The Commissioner is hereby authorized to charge any deficiency in the payment of the required fee(s) or credit any overpayment to Deposit Account No. 01-1960
5. ☐ Payment by credit card. Form PTO-2038 is attached.

\*Information required by 37 CFR 1.366(c) (columns 1 & 4). Information requested under 37 CFR 1.366(d) (columns 2, 3, 5, & 6)

Item	Patent Number*	Maintenance Fee Amount (37 CFR 1.20 (e)-(g))	Surcharge Amount (37 CFR 1.20 (h)-(i))	U.S. Application Number* [08/555,555]	Payment Year			Small Entity? **
					3.5 yrs	7.5 yrs	11.5 yrs	
1	5,635,235	\$425.00	\$65.00	476,198	2000			yes
2								
3								
4								
5								
6								

Subtotals Columns 2 & 3 \$490.00

Total Payment \$490.00

☐ additional sheets attached for listing additional patents.

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

[For Office Accounting Use Only]

Respectfully submitted\*\*\*: Joseph C. Andras  
Customer's name: MYERS, DAWES & ANDRAS LLP  
Telephone: (714) 444-1199  
Fax: (714) 444-1198  
Customer's Signature: [Signature]

REG. NO. 73,469

Note: \*All correspondence will be forwarded to the "Fee Address" or to the "Correspondence Address" if no "Fee Address" has been provided. 37 CFR 1.363.

\*\*Payment of small entity fee is appropriate if small entity status still exists, see 37 CFR 1.27(g).

\*\*\*WHERE MAINTENANCE FEE PAYMENTS ARE TO BE MADE BY AUTHORIZATION TO CHARGE A DEPOSIT ACCOUNT, BOTH CUSTOMER'S NAME AND SIGNATURE ARE REQUIRED.

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PTO/SB/81 (10-00)

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## POWER OF ATTORNEY OR AUTHORIZATION OF AGENT

Application Number	476,198
Filing Date	June 7, 1995
First Named Inventor	Sanchez, Victor R.
Group Art Unit	
Examiner Name	
Attorney Docket Number	CAS1.PAU.24

I hereby appoint:

☐ Practitioners at Customer Number

Place Customer  
Number Bar Code  
Label here

OR

☒ Practitioner(s) named below:

Name	Registration Number
Joseph C. Andras	33,469

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please change the correspondence address for the above-identified application to:

☐ The above-mentioned Customer Number.

OR

☒ Firm or  
Individual Name

Joseph C. Andras

Address MYERS, DAWES & ANDRAS LLP

Address 19900 MacArthur Boulevard, Suite 1150

City Irvine

State CA

Zip 92612

Country US

Telephone (949) 223-9600

Fax (949) 223-9610

I am the:

☐ Applicant/Inventor.

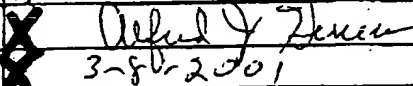
☒ Assignee of record of the entire interest. See 37 CFR 3.71.  
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/86).

### SIGNATURE of Applicant or Assignee of Record

Name

Casa Herrera, Inc.  
By Alfred J. Herrera, President

Signature



Date

3-8-2001

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☒ Total of 1 forms are submitted.

Burden Hour Statement: This form is estimated to take 3 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

**STATEMENT UNDER 37 CFR 3.73(b)**Applicant/Patent Owner: Casa Herrera, Inc.Applicant/Patent No.: 5,635,235Filing Date: June 3, 1997Entitled: Methods For Handling MasaCasa Herrera, Inc., a California Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or
2. ☐ an assignee of less than the entire right, title and interest.  
The extent (by, percentage) of its ownership interest is \_\_\_\_\_ %

in the ~~patent application~~ patent identified above by virtue of either:

- A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: the inventors To: Machine Masters, Inc.  
The document was recorded in the United States Patent and Trademark Office at Reel 7069, Frame 0592, or for which a copy thereof is attached.
2. From: Trustee in Bankruptcy for Machine Masters, Inc. To: Casa Herrera, Inc.  
The document was recorded in the United States Patent and Trademark Office at Reel 9950, Frame 0534, or for which a copy thereof is attached.
3. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

[ ] Additional documents in the chain of title are listed on a supplemental sheet.

- [ ] Copies of assignments or other documents in the chain of title are attached.  
[NOTE: A separate copy (i.e., the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

X 3-8-2001  
Date

Alfred J. Herrera

Typed or printed name

X Alfred J. Herrera  
Signature

President

Title

Please type a plus sign (+) inside this box →

+

PTO/SB/123 (10-00)

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# CHANGE OF CORRESPONDENCE ADDRESS Patent

Address to:  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Patent Number	5,635,235
Issue Date	June 3, 1997
Application Number	476,198
Filing Date	June 7, 1995
First Named Inventor	Sanchez, Victor R.

Please change the Correspondence Address for the above-identified patent to:

☐ Customer Number

Type Customer Number here

Place Customer  
Number Bar Code  
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OR

Firm or  
Individual Name

Joseph C. Andras

Address

MYERS, DAWES, &amp; ANDRAS LLP

Address

19900 MacArthur Boulevard, Suite 1150

City

Irvine

State

CA

ZIP

92612

Country

US

Telephone

(949) 223-9600

Fax

(949) 223-9610

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This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the :



Patentee.



Assignee of record of the entire interest. See 37 CFR 3.71.  
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/86).



Attorney or agent of record.

Typed or  
Printed Name

Casa Herrera, Inc.  
by Alfred J. Herrera, President

Signature

X *Alfred J. Herrera*

Date

X 3-8-2001

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☒ Total of 1 forms are submitted.

Burden Hour Statement: This form is estimated to take 3 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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**STATEMENT UNDER 37 CFR 3.73(b)**

Applicant/Patent Owner: Casa Herrera, Inc.  
 Application No./Patent No.: 5,635,235 Filing Date: June 3, 1997  
 Entitled: Methods For Handling Masa  
Casa Herrera, Inc., a California Corporation  
 (Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or  
 2. ☐ an assignee of less than the entire right, title and interest.  
 The extent (by, percentage) of its ownership interest is \_\_\_\_\_ %  
 in the ~~patent application~~ patent identified above by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

OR

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: the inventors To: Machine Masters, Inc.  
 The document was recorded in the United States Patent and Trademark Office at  
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 2. From: Trustee in Bankruptcy for Machine Masters, Inc. To: Casa Herrera, Inc.  
 The document was recorded in the United States Patent and Trademark Office at  
 Reel 9950, Frame 0534, or for which a copy thereof is attached.  
 3. From: \_\_\_\_\_ To: \_\_\_\_\_  
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☐ Additional documents in the chain of title are listed on a supplemental sheet.

☐ Copies of assignments or other documents in the chain of title are attached.  
 [NOTE: A separate copy (i.e., the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

☒ 3-8-2001  
 Date

Alfred J. Herrera  
 Typed or printed name

☒ Alfred J. Herrera  
 Signature

President  
 Title

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.



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OR

☒ Firm or  
 Individual Name

Joseph C. Andras

Address

MYERS, DAWES & ANDRAS

Address

19900 MacArthur Boulevard, Suite 1150

City

Irvine

State

CA

Zip

92612

Country

United States

Telephone

(949) 223-9600

Fax

(949) 223-9610

in the following listed application(s) for which the Issue Fee has been paid or patent(s).

PATENT NUMBER (if known)	APPLICATION NUMBER
5,635,235	476,198

(check one)

☐ Applicant/Inventor

☒ Attorney or Agent of record 33,469  
 (Reg. No.)

Joseph C. Andras

Signature

Typed or printed name

☐ Assignee of record of the entire interest. See  
 37 CFR 3.71. Statement under 37 CFR 3.73(b)  
 is enclosed. (Form PTO/SB/96)

(949) 223-9600

Customer's telephone number

☐ Assignment recorded at Reel \_\_\_\_\_ Frame \_\_\_\_\_

March 6, 2001

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

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3288

MYERS, DAWES & ANDRAS  
19900 MACARTHUR BLVD., STE 1150  
IRVINE, CA 92612

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Feb. 15, 2001

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3.5 yr. M. Fee

US Patent:  
5,635,235

003288 322271779 721 4092986

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AUTHORIZED SIGNATURE

MYERS, DAWES & ANDRAS LLP

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Feb. 15, 2001

CAS1.PAU.24

3.5 yr. M. Fee + Surcharge

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US Patent 5,635,235

JCA/aw

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Date: March 9, 2001  
Application No.: 476,198  
Filing Date: June 7, 1995  
Patent No. 5,635,235  
Issue Date: June 3, 1997  
Client: Casa Herrera, Inc.  
For: METHODS FOR HANDLING MASA  
Atty. Dkt. No.: CAS1.PAU.24

Enclosed:

1. Maintenance Fee Transmittal Form (plus 1 copy);
2. Power of Attorney with attachment: Statement Under 37 CFR 3.73(b);
3. Change of Correspondence Address with attachment: Statement Under 37 CFR 3.73(b);
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FACSIMILE TRANSMITTAL SHEET

TO: **Teresa Allen** FROM: **Angela for Joseph C. Andras**  
COMPANY: **United States PTO** DATE: **March 27, 2001**  
FAX NUMBER: **(703) 308-5077** TOTAL NO. OF PAGES INCLUDING COVER: **1**  
PHONE NUMBER: **(703) 308-5068** SENDER'S REFERENCE NUMBER: **CAS1.PAU.24**  
RE: **Application 09/325,122 of Sanchez et al. entitled "Methods for Handling Masa"**

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☒ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Dear Ms. Allen:

You have requested the following information to be faxed to you:

Reissue Patent No.: RE37008

Application No. to the Reissue Patent: 09/325,122

Please call me at 949-223-9655 if you require further information.

Sincerely,



Angela Williams

Certificate of Transmission by Facsimile

I hereby certify that this paper or fee is being facsimile transmitted to the United States Patent and Trademark Office (Fax No. 703-308-5077) on March 27, 2001.

Angela Williams



(Signature of person mailing paper or fee)

2001.03-27 10:33

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121	7033085077	03-27 10:32	00' 28	01/01	OK		

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**FACSIMILE TRANSMITTAL SHEET**

TO:	FROM:
<b>Teresa Allen</b>	<b>Angela for Joseph C. Andras</b>
COMPANY:	DATE:
<b>United States PTO</b>	<b>March 27, 2001</b>
FAX NUMBER:	TOTAL NO. OF PAGES INCLUDING COVER:
<b>(703) 308-5077</b>	<b>1</b>
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
<b>(703) 308-5068</b>	<b>CAS1.PAU.24</b>
RE:	
<b>Application 09/325,122 of Sanchez et al. entitled "Methods for Handling Masa"</b>	

☐ URGENT   ☐ FOR REVIEW   ☐ PLEASE COMMENT   ☒ PLEASE REPLY   ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Dear Ms. Allen:

You have requested the following information to be faxed to you:

Reissue Patent No.: RE37008

Application No. to the Reissue Patent: 09/325,122

Please call me at 949-223-9655 if you require further information.

Sincerely,

E





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Patent and Trademark Office  
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MYERS DAWES & ANDRAS LLP  
650 TOWN CENTER DRIVE  
SUITE 650  
COSTA MESA CA 92626

## MAINTENANCE FEE STATEMENT

The data shown below is from the records of the Patent and Trademark Office. If the maintenance fees and any necessary surcharges have been timely paid for the patents listed below, the notation "PAID" will appear in column 11, "STAT" below.

If a maintenance fee payment is defective, the reason is indicated by code in column 11, "STAT" below. **TIMELY CORRECTION IS REQUIRED IN ORDER TO AVOID EXPIRATION OF THE PATENT. NOTE 37 CFR 1.377. THE PAYMENT(S) WILL BE ENTERED UPON RECEIPT OF ACCEPTABLE CORRECTION. IF PAYMENT OR CORRECTION IS SUBMITTED DURING THE GRACE PERIOD, A SURCHARGE IS ALSO REQUIRED. NOTE 37 CFR 1.20(h).**

If the statement of small entity status is defective the reason is indicated below in column 10 for the related patent number. **THE STATEMENT OF SMALL ENTITY STATUS WILL BE ENTERED UPON RECEIPT OF ACCEPTABLE CORRECTION.**

ITEM NBR	PATENT NUMBER	FEE CDE	FEE AMT	SUR CHARGE	SERIAL NUMBER	PATENT DATE	FILE DATE	PAY SML YR ENT	STAT
1	RE 37.008	283	425	----	09/325,122	01/02/01	06/03/99	04 YES	PAID
		286	----	65					PAID

ITM  
NBR

1

ATTY DKT  
NUMBER

CAS1.PAU.24.

DIRECT THE RESPONSE TOGETHER WITH ANY QUESTIONS ABOUT THIS NOTICE TO:  
COMMISSIONER OF PATENTS AND TRADEMARKS, BOX M. FEE, WASHINGTON, D.C. 20231

RECEIVED  
APR 03 2001

**The official stamp of the PTO hereon  
acknowledges receipt of:**

Date: April 11, 2002  
Reissue of Patent No.: 5,635,235  
Date of Patent: June 3, 1997  
Client: Casa Herrera, Inc.  
For: METHOD FOR HANDLING MASA  
Atty. Dkt. No.: CAS1PAU24R2

---

Enclosed:

1. Request for Confirmation of  
Maintenance Fee Payment; and
2. Return postcard.

